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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,991

01/04/2005

Shinichi Ishibashi

Q85552

9188

23373 7590 02/27/2007
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EXAMINER

ROSASCO, STEPHEN D

ART UNIT

PAPER NUMBER

1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/519,991

Applicant(s)

ISHIBASHI ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 9-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>1/4/05</u> | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Applicant's election without traverse of Group I (claims 1-8 and 12) in the reply filed on 12/27/06 is acknowledged.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Yan (7,118,832).

Yan teaches (see claims 1-18) a reflective mask having an inspection contrast of greater than about 30% up to about 90%, for ultraviolet inspection light, the reflective mask comprising a reflector; and a plurality of absorber regions masking portions of the reflector, the absorber regions each including: absorber material comprising tantalum nitride; buffer material positioned between a first side of the absorber material and the reflector; and an anti-reflective coating comprising silicon nitride and positioned to cover a second side of the absorber material opposite the first side.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a

person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stivers et al. (6,410,193) in view of Yan et al. (6,610,447) and Yan et al. (6,607,862).

The claimed invention is directed to a reflective mask blank comprising a substrate, and a multilayer reflective film for reflecting an exposure light and an absorber layer for absorbing the exposure light, which are formed on said substrate in the order named, said reflective mask blank characterized in that said absorber layer has a layered structure comprising at least an uppermost layer and a lower layer other than it, and said uppermost layer exhibits a reflectance of 20% or less with respect to a light having an inspection wavelength for use in an inspection of an absorber layer pattern formed in said absorber layer and further is formed of an inorganic material having a resistance against an etching condition in forming a pattern in said lower layer.

The applicant discusses the limitations of the prior art in that if a difference in reflectance with respect to the wavelength of the inspection light is small between the surface of the buffer layer or the surface of the multilayer reflective film and the surface of the absorber layer, the contrast in the inspection becomes poor so that the accurate inspection cannot be achieved.

In the claimed invention an object is to obtain a reflective mask wherein a fine pattern can be formed in an absorber layer with high accuracy in shape, such that a sufficient contrast can be achieved in a pattern inspection.

Stivers et al. teach a reflective mask having non-reflective and reflective regions, said reflective regions reflective of light at an inspection wavelength and a semiconductor

processing wavelength, said non-reflective regions being less reflective of said first light and said second light than said reflective regions in order to create:

1) a first image with a contrast greater than 0.210 and that is formed by reflecting said first light off of said reflective mask; and 2) a second image with a contrast greater than 0.750 and that is formed by reflecting said second light off of said reflective mask.

And wherein said semiconductor processing wavelength is within the EUV spectrum and said inspection wavelength is within the DUV spectrum.

The teachings of Stivers et al. differ from those of the applicant in that the applicant teaches that the absorber is made of multi layers of Ta and Si.

Yan et al. '447 teach a reflective mask comprising a buffer layer and absorber and wherein the absorber layer can be multilayered – see DETX (41): The improved absorber layer 2400 may include one type of material or may be a stack of different materials. Variation in the layer, if desired, may be continuous or may be discrete with distinct interfaces. For example, in one embodiment, the improved absorber layer 2400 is a Ta_xNy film or Tantalum doped with Nitrogen in which $x=1$ and $y \leq 0.6$. In another embodiment, the improved absorber layer 2400 is Tantalum Nitride (TaN) in which the stoichiometry changes through the thickness of the film.

Yan et al. '862 teach that the absorptive layer comprises silicon germanium, tantalum, or tantalum nitride.

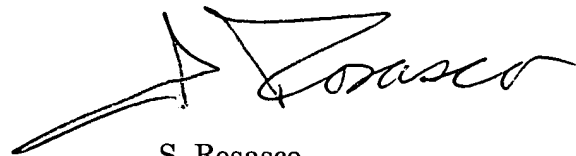
It would have been obvious to one having ordinary skill in the art to take the teachings of Stivers et al. and combine them with the teachings of Yan et al. '447 and Yan et al. '862 in order to make the claimed invention because it would have been obvious to choose the prior art combination of materials that would produce the desired etch contrast.

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Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, sweeping flourish extending from the left side.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
2/12/07